

WHAT IS CLAIMED IS:

1. A method for plating a substrate through a plating process performed with respect to the substrate by facing a surface of the substrate to be plated downward and immersing the substrate in a plating solution, the method comprising the steps of:

5 rotating the substrate in the plating solution at a first speed of rotation and thereby removing a bubble adsorbed to the substrate; and

after the step of removing the bubble, rotating the substrate in the plating solution at a second speed of rotation lower than the first speed of rotation and thereby performing the plating process with respect to the substrate.

10. 2. The method of claim 1, wherein the first speed of rotation is not less than 100 rpm and not more than 200 rpm.

3. The method of claim 1, wherein the second speed of rotation is not less than 10 rpm and not more than 60 rpm.

15 4. The method of claim 1, wherein a current density applied to the substrate in the step of removing the bubble is lower than a current density applied to the substrate in the step of performing the plating process with respect to the substrate.

5. The method of claim 1, further comprising, prior to the step of removing the bubble, the step of:

20 forming a seed layer on the surface of the substrate to be plated, wherein the step of removing the bubble includes the step of preventing the seed layer from being dissolved in the plating solution.

6. The method of claim 1, wherein the bubble has a size of 10 μm or less.

7. The method of claim 1, wherein

25 the substrate is held in the plating solution by a substrate holding mechanism having an electrode for contacting the surface to be plated and a seal for contacting the

surface to be plated in such a manner as to protect the electrode from the plating solution and

a contact angle of the seal relative to the surface to be plated is not less than 120° and not more than 150°.

5 8. The method of claim 1, wherein the step of removing the bubble includes the step of applying supersonic vibration to the plating solution.

9. The method of claim 1, further comprising, prior to the step of removing the bubble, the step of:

performing the plating process with respect to the substrate in the plating solution
10 until at least the one of depressed portions provided in the surface to be plated having a minimum diameter is filled up.

10. The method of claim 9, wherein a thickness of a plate film necessary to fill up the depressed portion having the minimum diameter is 20% or less of a target thickness of the plate film.

15 11. The method of claim 1, further comprising, prior to the step of removing the bubble, the step of:

immersing the substrate in the plating solution, while rotating the substrate at the first speed of rotation or at a third speed of rotation higher than the second speed of rotation.

20 12. A method for plating a substrate through a plating process performed with respect to the substrate by facing a surface of the substrate to be plated downward and immersing the substrate in a plating solution, the method comprising the step of:

improving a wettability of the surface to be plated before immersing the substrate in the plating solution.

25 13. The method of claim 12, wherein the step of improving the wettability

includes the step of supplying a liquid to the surface to be plated.

14. The method of claim 13, wherein the step of improving the wettability includes the step of removing a particle adhered to the surface to be plated.

15. The method of claim 14, wherein the step of removing the particle includes
5 the step of applying supersonic vibration to the surface to be plated.

16. The method of claim 14, wherein the step of removing the particle includes the step of supplying a liquid to which supersonic vibration has been applied to the surface to be plated.

17. The method of claim 12, further comprising, after the step of improving the
10 wettability, the step of:

rotating the substrate in the plating solution at a first speed of rotation to remove a bubble adsorbed to the substrate and then rotating the substrate in the plating solution at a second speed of rotation lower than the first speed of rotation to perform the plating process with respect to the substrate.

18. An apparatus for plating a substrate, the apparatus comprising:
15

a plating bath for reserving a plating solution;

a first electrode disposed in the plating bath;

a substrate holding mechanism for holding a substrate to which a plating process is to be performed;

20 a second electrode disposed in the substrate holding mechanism to contact a surface of the substrate to be plated;

a seal disposed in the substrate holding mechanism to contact the surface to be plated in such a manner as to protect the second electrode from the plating solution; and

25 a liquid supplying mechanism for supplying a liquid to which supersonic vibration has been applied to the surface to be plated from outside the plating bath.

19. The apparatus of claim 18, further comprising:

a plating solution circulating mechanism for circulating the plating solution reserved in the plating bath.

20. The apparatus of claim 18, wherein the substrate holding mechanism rotates
5 the substrate with the substrate being held thereby.

21. The apparatus of claim 18, wherein the first electrode is made of a material insoluble in the plating solution.

22. The apparatus of claim 18, wherein the first electrode is made of platinum.

23. The apparatus of claim 18, wherein a contact angle of the seal relative to the
10 surface to be plated is not less than 120° and not more than 150°.

24. An apparatus for plating a substrate, the apparatus comprising:

a plating bath for reserving a plating solution;

a first electrode disposed in the plating bath;

a substrate holding mechanism for holding a substrate to which a plating process
15 is to be performed;

a second electrode disposed in the substrate holding mechanism to contact a surface of the substrate to be plated;

a seal disposed in the substrate holding mechanism to contact the surface to be plated in such a manner as to protect the second electrode from the plating solution; and

20 a supersonic vibration applying mechanism disposed in the plating bath to apply supersonic vibration to the plating solution reserved in the plating bath.

25. The apparatus of claim 24, further comprising:

a liquid supplying mechanism for supplying a liquid to the surface to be plated from outside the plating bath.

26. The apparatus of claim 24, further comprising:

a plating solution circulating mechanism for circulating the plating solution reserved in the plating bath.

27. The apparatus of claim 24, wherein the substrate holding mechanism rotates the substrate with the substrate being held thereby.

5 28. The apparatus of claim 24, wherein the first electrode is made of a material insoluble in the plating solution.

29. The apparatus of claim 24, wherein the first electrode is made of platinum.

30. The apparatus of claim 24, wherein a contact angle of the seal relative to the surface to be plated is not less than 120° and not more than 150°.